

temperatures in the greenhouse during this period ranged from 75° to 85°F. As stated, the leafhopper was confined upon the host plant in a small celluloid cage, but in order that it might have reasonably good host material, it was moved to a fresh leaf every four or five days. The duration of the five nymphal stages, increasing in length with each instar, were 1, 4, 5, 10, and 18 days, respectively.

The main purpose of this brief article is to record the apparent protective mimicry which is enjoyed by the nymphs of this species when they follow their normal feeding habits. When placed upon the plants many of them soon found their way to the base of the petioles of the leaves and at this point they so closely resembled the stipules (Figure 1, A) that anyone unaccustomed to looking for them would have had considerable difficulty in finding them. They moved about very little after they had settled down for feeding on the stem. In one instance an individual was known to have fed for three weeks in the same position. This was determined from microscopic sections of the plant material to which this individual was exposed during the period. Feeding on the stem takes place with the head downward and with the abdomen pointing upward and curving outward from the stem. In this position the leafhopper is very similar in appearance to the stipules of the plant, which are of the same green color as the nymphs.

ENTOMOLOGY.—*A revisional study of the genus Pseudopityophthorus Sw. in North America.*¹ M. W. BLACKMAN, Bureau of Entomology, U. S. Department of Agriculture. (Communicated by HAROLD MORRISON.)

In a former paper on the genus *Pityophthorus* Eichh. and its allies in North America the writer (1928) treated in detail the taxonomy of the genera *Myeloborus* Blackm., *Pityophthorus* Eichh., *Pityoborus* Blackm., and *Pityophilus* Blackm., gave keys to the genera of the Pityophthori (which includes *Conophthorus* Hopk., *Pseudopityophthorus* Sw., and *Gnathotrichus* Eichh. in addition to those just mentioned), and discussed in a general way the relationships of these various genera. The present paper should be considered as a continuation of the larger paper and deals with the genera *Pseudopityophthorus* Sw., while another paper on *Gnathotrichus* Eichh. will follow immediately.

This paper is based upon a study of the Scolytid material in the National Museum and in the writer's own collection.

¹ Received April 16, 1931.

The Genus *Pseudopityophthorus* Swaine

The genus *Pseudopityophthorus* was described by Swaine (1918) as follows: "The antennal club with strongly arcuate sutures, the distal segments much wider than the first; the tibia coarsely serrate; the elytra not striate, irregularly finely punctulate; the intercoxal process of the prosternum elongate; the *male* with the front clothed with long arcuate yellow hairs. Allied to *Pityophthorus* Eichh., in which it has been included."

This description applies with exactness to the type species which is designated as *P. minutissimus* Zimmermann (1868) and applies reasonably well to all of the species in Division AA of the key on a succeeding page of the present paper. However, it does not apply in its entirety to the species in Division A, only one of which (*P. asperulus* Lec.) was known at the time Swaine's genus was erected. The members of this division differ in being usually smaller, with a more slender body, with the elytral punctures sparser and either in regular or nearly regular stria rows, with the declivity less strongly impressed, and with the septa of the antennal club subtransverse.

Before the erection of the genus *Pseudopityophthorus* by Swaine (1918) several species had been described and had been assigned to various genera by different authors.

P. pubipennis was first described by LeConte (1860) under the name of *Bostrichus pubipennis* from San Jose, Calif. Later LeConte (1868) referred it to the genus *Cryphalus* Er. and still later (1876) to *Pityophthorus* Eichh.

P. minutissimus Zimm. was described in 1868 as of the genus *Crypturgus* Er. LeConte (1868) transferred it to *Cryphalus* Er. and later (1876) to *Pityophthorus*.

P. asperulus Lec. was described by LeConte (1868) under the name of *Cryphalus asperulus*. Later the same author (1876) transferred it to *Pityophthorus*. Eichhoff (1878) retained it in *Pityophthorus* and placed it close to the other forms now included in *Pseudopityophthorus*. Schwarz (1886) referred to this species as *Gnathotrichus asperulus* and later writers, including Swaine (1909, 1918), have followed him. *Pseudopityophthorus gracilis* Blackm. described by the writer in 1921 should be regarded as a synonym of *asperulus* Lec.

P. pruinus was described by Eichhoff (1878) from "Carolina" as of the genus *Pityophthorus*. *Pityophthorus querciperda* described by Schwarz (1888) is identical, as has been pointed out by Eichhoff and Schwarz (1896).

Pityophthorus tomentosus was described by Eichhoff (1878) from "America borealis." This species has never been recognized with certainty since, and to the present writer it seems probable that it was based on an aberrant specimen of *P. pruinosus*.

The form described as *Cryphalus pilosus (pilosulus)* by LeConte (1868) was by him later (1876) transferred to *Pityophthorus*, in which it was retained by Eichhoff (1878) and Swaine (1909). In 1918 Swaine placed it among the species in his genus *Pseudopityophthorus*. An examination of the type of this species indicates that it belongs to neither *Pityophthorus* nor *Pseudopityophthorus*.

Harris (1837) described *Tomicus pusillus*. LeConte (1868) suggested that this species may be identical with *minutissimus* Zimm., and Eichhoff (1878) placed the latter name as a synonym of *Pityophthorus pusillus* Har. The species described by Harris can not be recognized at the present time. The description is rather general and might equally well be applied to several small Scolytids occurring in the Northeastern States and in fact has been used by various authors for species in several genera of bark beetles. The single specimen from which the description was prepared never formed a part of Harris's own collection and has apparently long since been lost.

KEY TO THE SPECIES OF PSEUDOPITYOPHTHORUS SW.

- A. Body more slender, more than 2.9 times as long as wide; elytra moderately to narrowly rounded behind, the punctures sparse to moderately numerous, in regular or nearly regular rows; declivity with second interspace weakly flattened; antennal club with septa of sutures 1 and 2 subtransverse.
 - B. Front of head in male narrow, flattened, not fringed with long hairs; that of female with a frontal elevation; antenna with club nearly twice as long as funicle; pronotum more than 1.2 times as long as wide; smaller, less than 1.25 mm. long. *asperulus* Lec.
 - BB. Front of head in male fringed with long hairs; antennal club less than 1.7 times as long as funicle; pronotum less than 1.15 times as long as wide; larger, more than 1.3 mm. long.
 - C. Elytra narrowly rounded behind; sides of pronotum not strongly constricted before the middle; antennal club with segments 2 and 3 subequal in width.
 - D. Smaller, less than 1.4 mm. long; pronotal summit not markedly lighter in color; elytral hairs nearly uniform, fine, short, semi-erect; Southeastern States. *fagi*, *n. sp.*
 - DD. Larger, more than 1.7 mm. long; pronotal summit notably lighter in color; elytral hairs more abundant, those from the interspaces coarser, longer, and more erect.
 - E. Pronotum with disc moderately shining, distinctly pubescent; elytra with hairs from the interspaces very long; declivity without granules; Southeastern States. *pubescens*, *n. sp.*
 - EE. Pronotal disc brightly shining, subglabrous; elytra with interspatial hairs moderately long; declivity with interspaces finely granulate; Southwestern States. *granulatus*, *n. sp.*

- CC. Elytra moderately rounded behind; sides of pronotum arcuate behind, strongly constricted before the middle; antennal club widest through third segment.....*agrifoliae*, *n. sp.*
- AA. Body stouter, less than 2.8 times as long as wide; elytra moderately to broadly rounded behind, the punctures irregular, very fine and close; declivity distinctly, often strongly impressed at each side of suture; antennal club with septa of sutures 1 and 2 strongly arcuate except in *minutissimus*.
- B. Smaller, less than 1.85 mm. long; elytra moderately rounded behind; pubescence very fine, short, appressed; antennal club with segments 2 and 3 subequal in width.
- C. Elytral pubescence uniform, not notably different on declivity; declivity faintly impressed at each side of suture; front of head broadly plano-concave; antennal club with septa of sutures 1 and 2 weakly arcuate; Eastern States.....*minutissimus* Zimm.
- CC. Elytral pubescence broader and more scalelike on the declivity; declivity distinctly impressed at each side of suture; front of head broadly plano-convex; antennal club with septa of sutures 1 and 2 moderately arcuate; Southwestern States.....*pulvereus*, *n. sp.*
- BB. Larger, more than 1.85 mm. long; elytra broadly rounded behind, pubescence coarser and longer, with longer hairs on certain discal interspaces and on the declivity; antennal club widest through the third segment, with septa of sutures 1 and 2 strongly arcuate.
- C. Front of head in male with an impunctate, shining, median callus; pronotum with sides feebly constricted before the middle, anterior margin very broadly rounded, disc moderately to brightly shining, more deeply, less closely punctured.
- D. Elytral pubescence dense, rather short and stout, that on the declivity longer on the first and third interspaces; smaller; Eastern States.....*pruinus* Eichh.
- DD. Elytral pubescence less dense, longer and more slender, the longer hairs on the declivity slender, long, and conspicuous, but often abraded; usually much larger; Western States.
- E. Disc of pronotum brightly shining, more sparsely punctured, devoid of pubescence; elytra less densely punctured, pubescence sparser; declivital hairs longer, finer, and more abundant; female frons with faint longitudinal carinal line
yavapaii, *n. sp.*
- EE. Disc of pronotum moderately shining, rather closely punctured, with very short hairs; elytra densely punctured and pubescent; declivital hairs shorter, coarser, and less abundant; female frons with small impunctate area above epistomal margin
pubipennis Lec.
- CC. Male frons without median callus; pronotum with sides strongly constricted before the middle, anterior margin narrower, the disc opaque, more closely and deeply punctured; elytra with the longer hairs of declivity rather stout.....*opacicollis*, *n. sp.*

Pseudopityophthorus asperulus Lec.

Figs. 1 and 2.

Description of the adult male.—Dark brown to black with the summit of the pronotum reddish-brown; 1.14 to 1.4 mm. long, slightly more than three times as long as wide.

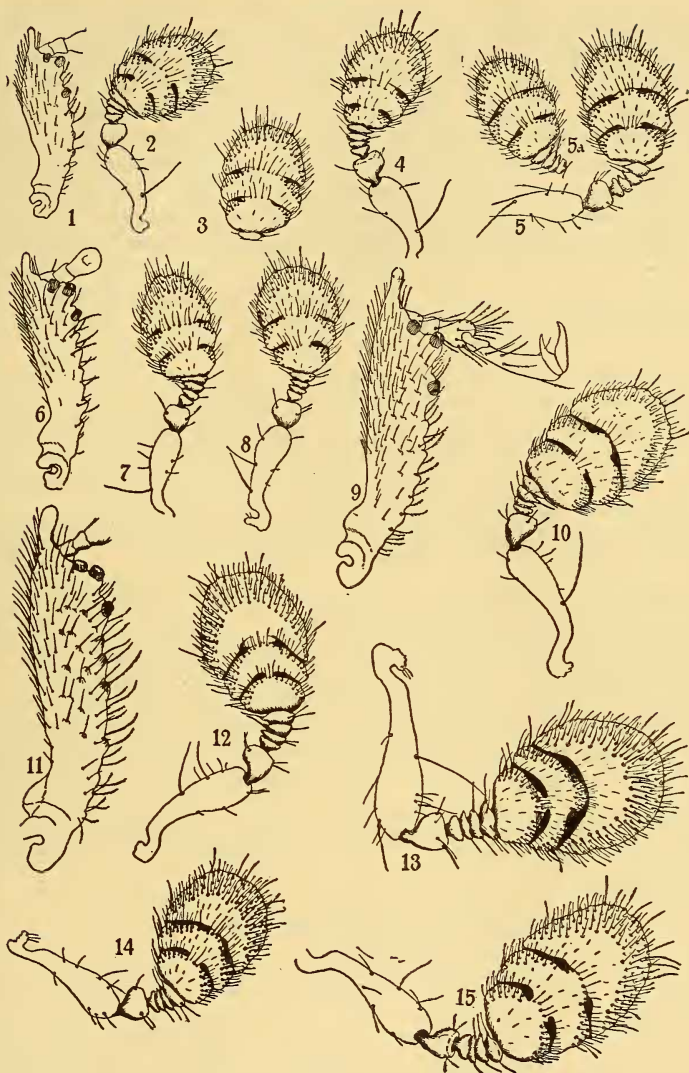


Fig. 1. Fore tibia of *Pseudopityophthorus asperulus* Lec.—Fig. 2. Antenna of *P. asperulus* Lec.—Fig. 3. Antenna of *P. fagi* n. sp.—Fig. 4. Antenna of *P. pubescens* n. sp.—Fig. 5. Antenna of *P. granulatus* n. sp. male, 5a female.—Fig. 6. Fore tibia of *P. minutissimus* Zimm.—Fig. 7. Antenna of *P. minutissimus* Zimm.—Fig. 8. Antenna of *P. agrifoliae* n. sp.—Fig. 9. Fore tibia of *P. pulvereus* n. sp.—Fig. 10. Antenna of *P. pulvereus* n. sp.—Fig. 11. Fore tibia of *P. yawapaii* n. sp.—Fig. 12. Antenna of *P. yawapaii* n. sp.—Fig. 13. Antenna of *P. pruinosus* Eichh.—Fig. 14. Antenna of *P. pubipennis* Lec.—Fig. 15. Antenna of *P. opacicollis* n. sp.

All figures were made by the writer from preparations mounted in balsam, using a compound microscope and a camera lucida. All are magnified about 112 diameters.

Front of head flattened on a semicircular area, shining, finely, not closely punctured, with fine, sparse, rather short, cinereous pubescence. *Eye* finely granulate, rather broadly and deeply emarginate. *Antenna* lighter in color; the club 1.9 times as long as funicle, 1.32 times as long as wide, segments 2 and 3 subequal in width, septa of sutures 1 and 2 feebly arcuate, subtransverse.

Pronotum one-fourth longer than wide, widest on the posterior half, with the sides weakly arcuate posteriorly, very faintly constricted before the middle, moderately narrowly rounded in front, with the anterior portion extending well beyond the front of the head; anterior margin rather strongly, regularly serrate; anterior area strongly asperate; summit moderate, much lighter in color, anterior to the middle, with a moderately well-developed, transverse impression posterior to it; posterior area moderately shining, finely, sparsely punctulate, median longitudinal line rather broad, feebly elevated.

Elytra subequal to pronotum in width, 1.8 as long as wide; the sides subparallel, rather narrowly rounded behind; surface shining; strial punctures minute, in fairly definite rows, each bearing an extremely minute hair (not usually visible); interspaces scarcely punctured on the disc, but on sides and declivity moderately punctured, with very fine erect hairs of moderate length. *Declivity* convex, the second interspace very feebly flattened.

The *female* is similar, but the front of the head is more roughly punctured, has a median elevation, and the hairs are smaller.

Pseudopityophthorus gracilus Blkm., described by the writer from Mississippi, is on the average slightly more slender and more finely punctured than the average *P. asperulus* Lec. but apparently falls within the range of variation of this species. The specific name should be submerged.

The writer has studied specimens of this species from Maine, Massachusetts, Connecticut, New York, Pennsylvania, District of Columbia, West Virginia, North Carolina, Florida, Mississippi, Louisiana, and Texas. The various species of *Quercus* occurring in this wide territory most commonly serve as hosts, but specimens have also been studied from *Castanea dentata* and *Betula populifolia*.

Pseudopityophthorus fagi, new species

Fig. 3.

Description of the adult male.—Dark reddish-brown; 1.37 mm. long, 3.0 times as long as wide.

Front of the head rather narrow, convex, slightly flattened below, the median area shining, impunctate or nearly so, densely punctured above and at the sides, and ornamented with rather long yellowish hairs which are strongly incurved and directed toward the center. *Eye* finely granulate, the inner line strongly emarginate. *Antenna* considerably lighter in color, club more than one-half longer than funicle, about one-third longer than wide, second and third segments subequal in width, septa sub-transverse.

Pronotum 1.15 as long as wide, the sides subparallel, faintly constricted in front of the middle, broadly rounded in front; anterior margin slightly extended, with numerous, subequal, regular serrations; anterior area finely asperate; summit moderately elevated, with the transverse impression posterior to it feebly developed; posterior area feebly shining, finely but rather deeply punctured, median longitudinal line scarcely elevated.

Elytra about equal in width to pronotum, 1.8 times as long as wide; the

sides subparallel as far as the origin of the declivity, rather narrowly rounded behind; surface moderately shining, finely rugulose; strial punctures very fine, in slightly irregular rows; interspaces rugulose, very finely punctured. *Declivity* convex, very faintly flattened, interspaces 1 to 3 very minutely granulate-punctate. Elytral pubescence only slightly better developed on the declivity, more abundant than in *asperulus*, the hairs from the interspaces slightly longer, coarser and more erect, especially on the declivity.

The *female* is similar in size and proportions, with the front of the head wider, convex, shining, and impunctate in the median area, closely and finely punctured at the sides and above, with a few inconspicuous hairs; declivital granules absent.

Type.—Cat. No. 43423, U. S. N. M.

Type, allotype, and four paratypes bear the labels—"Hopk. W. Va. 7142 a a; A. D. Hopkins, Collector; Midland Farm, Morgantown, W. Va.; Nov. 26, '96; Fagus."

The type series of six specimens are all that have been seen by the writer.

Pseudopityophthorus pubescens, new species

Fig. 4.

Description of the adult male.—Dark reddish-brown, almost black, except the summit of the pronotum which is light reddish-brown; 1.8 mm. long; 2.9 times as long as wide.

Front of head plano-concave on an approximate circle extending from eye to eye, surface moderately shining, finely punctured, granulate-rugulose, more strongly and closely punctured at the periphery, and ornamented with a fringe of long, coarse, yellow hairs directed meso-ventrally and masking the frons. *Eye* rather finely granulate, moderately broadly and deeply emarginate on the inner line. *Antenna* much lighter in color, the club 1.65 longer than funicle, 1.32 longer than wide, third segment slightly wider than second and much wider than first; septa of sutures 1 and 2 subtransverse, weakly arcuate.

Pronotum 1.13 times as long as wide, the sides on the posterior half weakly arcuate, feebly constricted in front of the middle, rather broadly rounded in front; anterior margin with numerous, very broad, low serrations; anterior area with approximately concentric rows of broad, low asperities; summit reddish-brown, moderately low, central in position, with a moderately strong, transverse impression posterior to it; posterior area moderately shining, with very fine, moderately close punctures; median longitudinal line not elevated; sides and anterior area with rather long upright hairs, those on the disc less conspicuous, sparser, shorter, and finer.

Elytra subequal in width, one and three-fourth times as long as wide, the sides subparallel, moderately narrowly rounded behind; surface feebly shining, rugulose; the strial punctures very fine, in fairly definite rows, with short, reclinate, cinereous hairs; punctures of interspaces still more minute, more numerous, irregular in arrangement, giving origin to much longer, erect, fine hairs. *Declivity* convex, faintly impressed at each side of suture; strial hairs broad and more scalelike, the longer hairs shorter and thicker than on the disc and sides.

The *female* is similar, but the front of the head is not so strongly and broadly flattened, the punctures and pubescence are more evenly distributed, and the hairs are shorter and much finer.

Type.—Cat. No. 43424, U. S. N. M.

Type and one paratype bear the labels—"Hopk. U. S., 3040; Tryon, N. C.;

Castanea dentata; W. F. Fiske, Collector;" allotype and two paratypes—"Hopk. U. S. 2546-b; W. F. Fiske, Coll.; Tryon, N. C.; Dec. 16, '03; *Quercus rubra*;" six paratypes—"Hopk. U. S., 575; Carter Bridge, Va., White oak."

***Pseudopityophthorus granulatus*, new species**

Figs. 5 and 5a.

Description of the adult male.—Very dark brown to black, with the summit of the pronotum light reddish-brown; 1.8 mm. long, 3.1 times as long as wide.

Front of the head broadly flattened, feebly concave at the center, finely, moderately sparsely punctured, with a few, fine, moderately long, cinereous hairs, the frons more or less masked by a wisp of coarser, longer, bright yellow hairs originating from the top of the head and extending downward. *Eye* finely granulate, the inner line rather deeply emarginate. *Antenna* lighter in color, the club 1.6 times as long as the funicle, 1.4 times as long as wide, the second and third segments subequal in width, the septa subtransverse.

Pronotum 1.1 times as long as wide, widest on the posterior half, the sides subparallel behind, scarcely at all constricted before the middle, moderately broadly rounded in front; the anterior margin with numerous subequal, fine, regular serrations; anterior area finely asperate; summit low, with scarcely any transverse depression posterior to it, bright reddish brown, contrasting sharply with the very dark brown to black of the rest of pronotum and elytra; posterior area brightly shining, moderately finely punctured, median impunctate line slightly elevated.

Elytra about equal in width to pronotum, 1.9 times as long as wide; the sides subparallel as far back as the declivity, rather narrowly rounded behind; the surface moderately shining, finely rugulose; the striae punctures very minute, in regular rows, each bearing a short, semierect hair; the interspaces with the punctures more sparse, still more minute, the hairs longer, more erect, and coarser. *Declivity* convex, the suture scarcely elevated, with a sparse row of fine but distinct granules; second interspace slightly flattened, for the most part smooth, but with from two to four small granules in each; third interspace with four to six granules; the interstriae hairs only slightly longer on the declivity.

Type.—Cat. No. 43425, U. S. N. M.

Type allotype, and 54 paratypes bear the labels—"Prescott, N. F., Ariz., VI-10-30; M. W. Blackman collector; Hopk. U. S. 20404 R.; *Quercus*;" one paratype—"S. Rita Mts., 13-6, Ar.; coll. Hubbard and Schwarz."

The type series of more than 50 specimens does not show the usual secondary sexual differences. The *frons* in all of the specimens is flattened and ornamented as described above, with but little differences in the sculpture and pubescence. It would seem nearly certain, however, that both sexes are represented, as all but one specimen were taken by the writer from recently started burrows in oak twigs. Certain specimens are, however, slightly smaller, show slightly finer sculpture, have a smaller antennal club and slightly sparser frontal pubescence, and these are believed to be females.

***Pseudopityophthorus agrifoliae*, new species**

Fig. 8.

Description of the adult male.—Dark reddish-brown; 1.97 mm. long, 2.95 times as long as wide.

Front of the head convex, slightly flattened below; with moderately fine,

deep punctures, with long, incurved, yellow, frontal hairs arising principally from the peripheral area at the sides and above. *Eye* finely granulate, moderately emarginate. *Antenna* much lighter in color, club 1.69 times as long as funicle, 1.3 times as long as wide; widest through the third segment, the second and first progressively narrower; septa subtransverse.

Pronotum 1.06 times as long as wide, widest behind the middle, the sides decidedly arcuate, distinctly constricted in front of the middle, moderately broadly rounded in front; anterior margin with numerous, regular, low serrations, those at the sides at least as coarse as those near the middle; anterior area with numerous asperities in slightly irregular concentric rows, becoming much smaller toward the summit; summit slightly higher than in *minutissimus*, with the transverse impression stronger; posterior area moderately shining, closely, very finely punctured, and finely rugulose; median line rather feebly elevated.

Elytra as wide as pronotum, 1.8 times as long as wide, with the sides subparallel as far back as the declivity, moderately rounded behind; surface moderately shining, finely rugulose; minutely and subregularly punctured, with indications of striae rows on the disc and sides, the pubescence cinereous, fine, short, often abraded. *Declivity* convex, suture feebly elevated; second interspace flattened, devoid of pubescence in the middle third, pubescence on declivity slightly longer.

Type.—Cat. No. 43426, U. S. N. M.

Type and two paratypes bear the labels—"Hopk. U. S., 11^a; A. D. Hopkins, coll.; Golden Gate Park, Cal.; Apr. 20, 1899; *Quercus agrifolia*."

Pseudopityophthorus minutissimus Zimm.

Figs. 6 and 7.

Description of the adult male.—Dark reddish-brown; about 1.5 to 1.86 mm. long, 2.77 times as long as wide.

Front of head very broadly plano-concave on a subcircular area extending from eye to eye, surface very finely and densely reticulate, the central portion impunctate, punctured peripherally, and ornamented with rather coarse, long, incurved yellow hairs; epistomal margin broadly emarginate. *Eye* finely granulate, inner line emarginate. *Antenna* somewhat lighter in color, club 1.75 times as long as funicle, 1.4 times as long as wide, segments 2 and 3 subequal in width, the first much narrower, septa of sutures 1 and 2 subtransverse.

Pronotum slightly longer than wide, the sides behind subparallel, feebly arcuate, feebly constricted before the middle, rather broadly rounded in front; anterior margin with numerous sharp, regular serrations; anterior area strongly asperate, summit rather low, usually concolorous, with the transverse impression weak; posterior area subopaque to moderately shining, surface finely reticulate, very finely punctured, median longitudinal line feebly elevated.

Elytra as wide as pronotum, 1.68 times as long as wide, the sides subparallel, moderately rounded behind; surface feebly shining, finely rugulose; irregularly, minutely punctured, with little evidence of arrangement in striae rows, each puncture bearing a fine, short, reclining, cinereous hair, often abraded. *Declivity* convex, the suture narrow and feebly elevated, faintly flattened at each side; pubescence not notably longer or coarser.

The *female* is of about the same size and proportions, with the frontal serrations and asperities slightly finer; front of head not so widely or strongly flattened, finely and densely punctured and ornamented with very fine cinereous pubescence of moderate length, which is shorter and sparser in the median epistomal area.

This species is widely distributed and varies considerably in various localities and hosts but a long series from one locality will often show nearly the entire range of variation. As a usual thing specimens from a colder climate seem to be larger as shown by a series from West Point, New York, and another from Ute Pass, Colorado. At West Point the maximum size of 1.86 mm. is attained and the average of the series of 24 specimens is well above 1.7 mm. In series from farther south only occasional specimens exceed 1.6 mm. in length.

The writer has studied many hundreds of specimens from Massachusetts, Connecticut, New Jersey, Pennsylvania, Colorado, Maryland, District of Columbia, West Virginia, Virginia, Tennessee, Mississippi, North Carolina, and Georgia. This bark beetle breeds most commonly in the various species of *Quercus*, but specimens have also been studied from *Castanea*, *Betula*, *Fagus*, *Carpinus*, *Ostrya*, *Hicoria*, *Cornus*, *Hammamelis*, *Amelanchier*, and *Pinus* (?).

***Pseudopityophthorus pulvereus*, new species**

Figs. 9 and 10.

Description of the adult male.—Dark reddish-brown; 1.67 mm. long, 2.76 times as long as wide.

Front of the head broadly plano-convex, weakly, transversely impressed above the epistomal margin, with a median shining callus, finely and closely punctured at the sides and above, and ornamented with long, rather coarse, yellow hairs masking the frons. *Eye* finely granulate, the inner line strongly emarginate. *Antenna* somewhat lighter in color, the club twice as long as wide, the second and third segments subequal in width, the septa moderately arcuate.

Pronotum 1.1 times as long as wide, the sides subparallel on the posterior half, feebly constricted before the middle, broadly rounded in front; anterior margin with numerous, rather broad, low serrations; anterior area moderately asperate; summit low and the posterior transverse impression very weak; posterior area shining, very finely, rather sparsely punctulate, the median longitudinal line feebly elevated.

Elytra about as wide as pronotum, 1.68 times as long as wide, the sides subparallel, moderately rounded behind; surface subopaque to feebly shining, finely rugulose, closely, irregularly, minutely punctured, with no evidence of striae rows; each puncture on the disc and sides bearing a fine, short, reclining hair. *Declivity* convex, the suture slightly elevated, the region of the second interspace distinctly impressed; pubescence flattened and more scalelike.

The *female* is similar in size and proportions, but with the front of the head less strongly flattened, without a shining callus, finely, moderately closely punctured and ornamented with very fine, moderately long, cinereous hairs of nearly uniform length.

Type.—Cat. No. 43427, U.S.N.M.

The type and three paratypes bear the labels—"Hopk. U. S. 5580; Nov. 11, '07; J. L. Webb coll.; Chiracahua Reserve, Ariz.; *Quercus*:" allotype—"S. Rita Mts., 26.5, Ar.; coll. Hubbard and Schwarz."

***Pseudopityophthorus pruinus* Eichh.**

(*Pityophthorus querciperda* Sz.)

Figs. 13 and 14.

Description of the adult male.—Reddish-brown; 1.93 mm. long, 2.79 times as long as wide.

Front of head broadly flattened, the median area elevated, shining, impunctate, densely punctured at sides and above, and ornamented with a dense fringe of long, moderately coarse, yellow, converging hairs which mask the frons. *Eye* finely granulate, narrowly emarginate. *Antenna* considerably lighter in color, the club 1.75 times as long as funicle, 1.37 times as long as wide, the third segment wider than second and nearly twice as wide as first, the septa strongly arcuate.

Pronotum 1.1 times as long as wide, the sides subparallel, faintly arcuate behind, slightly constricted anterior to the middle; moderately broadly rounded in front; the anterior margin with numerous fine serrations; anterior area finely asperate, the asperities finer and reddish toward the summit, which is low; posterior area rather sparsely, finely punctured, moderately shining, nearly glabrous.

Elytra scarcely wider than pronotum, the sides subparallel, broadly rounded behind, surface finely, irregularly, rather densely punctured, with the abundant pubescence short and stout, less abundant near suture and more slender toward the sides of the disc. *Declivity* convex, distinctly impressed at each side of the suture, the pubescence longer and more erect on all the interspaces except the second.

The *female* is similar in size, proportions, and general appearance, but with the front of the head more convex, finely, closely punctured, and ornamented with very slender, rather short, cinereous hairs.

The above description is based partly upon a specimen from Eichhoff's type series of *P. pruinus* and partly upon the type series of *P. querciperda* Schwarz. In connection with these the author has studied hundreds of specimens in the United States National Museum collection and in his private collection.

This species is widely distributed over the eastern portion of the country from Michigan and New York to Texas and Florida. The writer has studied specimens from Michigan, New York, New Jersey, Pennsylvania, District of Columbia, West Virginia, Tennessee, North Carolina, South Carolina, Georgia, Mississippi, Louisiana, Texas, and Florida. The various species of *Quercus* most commonly serve as the hosts, but specimens from *Castanea*, *Fagus*, *Hicoria*, *Carpinus*, *Ostrya*, *Acer*, and *Pinus* (?) have been examined, and all come within the limits of the species.

Probably *Pityophthorus tomentosus* Eichh. should also be considered as a synonym of *P. pruinus* Eichh. from which it was said by Eichhoff to differ especially in the pronotum being sub-inflated posteriorly. Such variations are not uncommon in long series of *pruinus*.

***Pseudopityophthorus yavapaii*, new species**

Figs. 11 and 12.

Description of the adult male.—Dark reddish-brown with the disc of pronotum and often that of elytra lighter in color; 2.23 mm. long, 2.69 times as long as wide.

Front of the head broadly flattened from eye to eye, transversely impressed above the epistomal margin, with a median, shining, impunctate callus; the peripheral portion finely, closely punctured, and bearing hairs, those toward the center cinereous, rather fine, and of medium length, those from the outside,

bright yellow, coarser, much longer, and converging over the frons so as to mask it. *Eye* finely granulate, the inner line deeply and broadly emarginate. *Antenna* much lighter in color; the club 1.75 times as long as funicle, 1.38 times as long as wide; widest through the third segment, with the second and first progressively narrower; septa strongly arcuate.

Pronotum slightly longer than wide, the sides subparallel, weakly arcuate behind, feebly constricted before the middle, broadly rounded in front; anterior margin with very low serrations (weaker than in *pubipennis*); anterior area with the numerous asperities very broad and low, summit low, and transverse impression weak; posterior area brightly shining, the punctures fine, more sparse than in *pubipennis*, the disc glabrous, the pubescence on the sides and in the asperate area short and much sparser than in *pubipennis*; median longitudinal line broad, not elevated.

Elytra nearly equal to pronotum in width, 1.68 times as long as wide; the sides subparallel, broadly rounded behind; surface shining; finely, moderately closely, irregularly punctured (more coarsely and less densely than in *pubipennis*); the pubescence similar to that of *pubipennis* but sparser. *Declivity* similar to *pubipennis*, but with the erect hairs longer, finer, and more numerous; the suture scarcely elevated, with a sparse row of minute granules.

The females average slightly smaller than the males, are similar in general proportions and sculpture, but have the long hairs on the declivity not so well-developed; the front of the head is less broadly flattened, devoid of the median impunctate callus, but with faint indications of a median, longitudinal carina; the hairs are finer, shorter, and evenly distributed.

Type.—Cat. No. 43428, U.S.N.M.

Type, allotype, and 112 paratypes bear the labels—"Prescott, N. F., Ariz. VI-10-30; M. W. Blackman, collector; Hopkins U. S. 20404-Q; Quercus:" 19 paratypes—"Hopk. U. S. 5580; J. L. Webb, collector; Chiricahua Reserve, Ariz.; Live oak:" two paratypes—"Hopk. U. S. 7189; M. Chrisman, collector; Bred, 8-9-08:" three paratypes—"Hopk. U. S. 7706; M. Chrisman, collector; Sta. Catalina Mts., Ariz.; Black Jack:" two paratypes—"S. Rita Mts., Ariz., 6-6; coll. Hubbard and Schwarz:" one paratype—"Chiric. Mts., Ariz. 19-6; coll. Hubbard and Schwarz:" one paratype—"Arizona, Morrison; coll. Hubbard and Schwarz."

Pseudopityophthorus pubipennis Lec.

Fig. 14.

Description of the adult male.—Reddish-brown to nearly black; 2.1 to 2.3 mm. long, 2.75 times as long as wide.

Front of head broadly flattened, with a median, shining, smooth callus, the periphery finely, densely punctured and ornamented with a dense fringe of long, rather coarse, yellow hairs which extend downward and converge, masking the frons. *Eye* finely granulate, the inner line deeply and widely emarginate. *Antenna* somewhat lighter in color, the club about twice as long as funicle, about one-third longer than wide, widest through the third segment, with the second and first progressively narrower; the septa arcuate.

Pronotum slightly longer than wide, the sides rather weakly arcuate posteriorly, faintly constricted well before the middle, broadly rounded in front; anterior margin with numerous rather broad low serrations; anterior area with numerous broad low asperities; summit low with only a weak transverse impression posterior to it; summit and disc much lighter in color; posterior area moderately shining, finely, moderately closely punctured with a few very short hairs (often abraded on the disc), the sides with longer hairs; median longitudinal line broad, scarcely elevated.

Elytra about equal in width, 1.66 times as long as wide, the sides subparallel, broadly rounded behind; surface feebly shining, irregularly, very finely and densely punctured, rather densely clothed with cinereous recumbent hairs, with a few, longer, more erect ones, becoming more numerous and longer on the declivity. *Declivity* convex, moderately abrupt, slightly depressed at each side of the suture.

The *female* is similar in general proportions, but with the frons not so broadly flattened, and ornamented with rather fine cinereous hairs of moderate length, evenly distributed except on a small, shining, impunctate area just above the epistomal region.

The foregoing description was prepared from specimens compared with LeConte's type series.

This species is western in its distribution, the type series having been collected in California. The writer has examined several hundreds of specimens from California, Oregon, and Washington. All are from the various western species of *Quercus*.

***Pseudopityophthorus opacicollis*, new species**

Fig. 15.

Description of adult male.—Dark brown; 2.18 mm. long, 2.7 times as long as wide.

Front of the head flattened from eye to eye, without median callus but with a median, impunctate, shining area just above the epistomal margin, the rest of the frons punctured and bearing hairs, those at outside much longer, coarse, and yellow, converging over and masking the frons. *Eye* finely granulate, rather deeply and widely emarginate. *Antenna* lighter in color, club more than twice as long as funicle, 1.5 times as long as wide; the third segment slightly wider than second, the first much narrower; septa strongly arcuate.

Pronotum scarcely longer than wide, widest behind the middle, with the sides subparallel on the posterior half; strongly constricted before the middle, moderately rounded in front; anterior margin with numerous rather broad, low serrations; anterior area with approximately concentric rows of rather coarse asperities, which are gradually reduced to concentric rugae on the rather low summit; posterior area subopaque, closely, finely, and deeply punctured, slightly more coarsely and sparsely on the sides; median longitudinal line scarcely elevated behind, more strongly anteriorly in the broad, shallow, transverse impression; pubescence on anterior area and sides moderately short, that on the disc shorter and finer.

Elytra similar in width to pronotum, 1.7 times as long as wide; the sides subparallel, moderately rounded behind; surface subopaque or feebly shining, rugulose; the punctures fine, rather dense, irregular, with no indications of striae on the disc; pubescence short, rather stout, reclining, with a very few, longer, more erect hairs on the suture and region of third interspace. *Declivity* convex, impressed at each side of the slightly elevated suture; suture and third interspace bearing longer, coarser, more erect hairs.

The *female* is of similar proportions, but the front of the head is not so strongly flattened, the median area just above the epistomal margin shining and impunctate, rather closely and finely punctured, and ornamented with fine hairs of moderate length at the sides and above.

This species is rather closely allied to both *pubipennis* Lec. and *yavapaii*,

new species, but is readily distinguished by the shape and sculpture of the pronotum, the character of the longer elytral hairs, and by other differences brought out in the descriptions.

Type.—Cat. No. 43429, U.S.N.M.

Type, allotype, and four paratypes bear the labels—"Hopk. U. S. 5644; reared Sept. 1, '08; J. L. Webb, colr.; Sta. Catalina Mts. Ariz.; Quercus:" five paratypes—"Hopk. U. S. 7199h, 4-15-08; M. Chrisman, colr.; Sta. Catalina Mts., Ariz.; Quercus:" 23 paratypes—"Hopk. U. S. 10366-b; reared Sept. 25, '13; M. Chrisman, colr.; Sta. Catalina Mts., Ariz.; Quercus emoryi:" three paratypes—"Hopk. U. S. 10387; M. Chrisman colr.: Sta. Catalina Mts., Ariz.; Sept. 18-13, Quercus emoryi:" seven paratypes—"Hopk. U. S. 10519a; reared July 28, '13; M. Chrisman, colr.; Sta. Catalina Mts., Ariz.; Black jack and Buck acorn."

BIBLIOGRAPHY

- BLACKMAN, M. W. *Description of eight new bark beetles from Mississippi*. Miss. Agr. Exp. Sta., Tech. Bull. No. 10, pp. 1-16, 2 pls. 1921.
- BLACKMAN, M. W. *Mississippi bark beetles*. Miss. Agr. Exp. Sta., Tech. Bull. No. 11, 130 pp., 18 pls. 1922.
- BLACKMAN, M. W. *The genus Pityophthorus Eichh. in North America: A revisional study of the Pityophthori, with descriptions of two new genera and seventy-one new species*. Tech. Publ. No. 25. N. Y. S. Coll. Forestry, 182 pp., 11 pls. 1928.
- FITCH, A. *Fourth report on the noxious insects of New York*. N. Y. State Agr. Soc. Ann. Rept. 1857, pp. 687-814. 1858.
- EICHHOFF, W. *Ratio, descriptio, emendatio Tomicinorum*. Mem. Soc. Roy. Sci., de Liege VIII, 531 pp. 1878.
- EICHHOFF, W., and SCHWARZ, E. A. *Remarks on the synonymy of some North American Scolytid beetles*. Proc. U. S. Nat. Mus., XVIII, pp. 605-610. 1896.
- HARRIS, T. W. *Characteristics of some previously described North American Coleopterous insects and descriptions of others which appear to be new, in the collection of Mr. Abraham Halsey*. Trans. Nat. Hist. Soc. Hartford. 1836.
- HOPKINS, A. D. *Sexual characters in Scolytidae*. Canad. Ent., 26: 274-280. 1894.
- HOPKINS, A. D. *List of generic names and their type species in the Coleopterous superfamily Scolytoidea*. Proc. U. S. Nat. Mus., 48: 115-136. 1914.
- HOPKINS, A. D. *A new genus of Scolytid beetles*. This JOURNAL 5: 429-433. 1915.
- HUBBARD, H. G., and SCHWARZ, E. A. *Coleoptera of Florida and Michigan*. Proc. Amer. Phil. Soc., 17: 353-472 and 593-669. 1878.
- LECONTE, J. L. *Zoology: Report upon insects collected on the survey*. Rept. Pac. R. R. Expl. & Survey Ins., No. 1, pp. 1-72, 2 pls. p. 59. 1860.
- LECONTE, J. L. *Appendix to Zimmerman's synopsis of Scolytidae*. Trans. Amer. Ent. Soc., 2: 150-178. 1868.
- LECONTE, J. L. *The Rhynchophora of America north of Mexico*. Proc. Amer. Phil. Soc., XV, No. 96, pp. 455. 1876.
- PACKARD, A. S. *Insects injurious to forest and shade trees*. V. Rept. U. S. Ent. Comm., pp. 1-955. 1890.
- SCHWARZ, E. A. *Remarks on North American Scolytids*. Ent. Amer., 2: 40-42. 1886.
- SCHWARZ, E. A. *Remarks*. Ent. Soc. Wash. Proc., 1: 56. 1888.
- SWAINE, J. M. *Catalogue of the described Scolytidae of America north of Mexico*. N. Y. State Mus., Bull. 134, pp. 75-194. 1909.
- SWAINE, J. M. *Canadian bark beetles*. Dom. Ent. Br. Dept. Agr., Bull. 14, Pt. II, pp. 1-143. 1918.
- ZIMMERMANN, C. *Synopsis of the Scolytidae of America north of Mexico*. Trans. Amer. Ent. Soc., 2: 141-149. 1868.